PATENT ABSTRACTS OF JAPAN

(11)Publication number : **2000-100562**
(43)Date of publication of application : **07.04.2000**

(51)Int.CI. H05B 33/04
H05B 33/10
H05B 33/14

(21)Application number : **10-268489**
(22)Date of filing : **22.09.1998**

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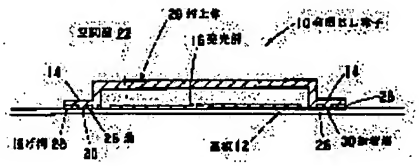
(54) ORGANIC EL ELEMENT AND ITS MANUFACTURE

(57)Abstract:
PROBLEM TO BE SOLVED: To provide an organic EL element having a display section with a large area, capable of miniaturizing a device and having high durability and to provide its manufacturing method.
SOLUTION: A luminescence section 16 constituted of a transparent electrode formed with a transparent electrode material such as ITO, a luminescent layer laminated on the transparent electrode and made of an EL material and a back electrode laminated on the luminescent layer to face the transparent electrode and a sealing body 20 covering and sealing the luminescence section 16 from the outside are provided on the surface of a transparent substrate 12 made of glass or a resin. Multiple grooves 26 extended along the peripheral edge section of the sealing body 20 are formed at the portion of the peripheral edge section of the sealing body 20 stuck to the substrate 12, an adhesive 30 is applied on the whole periphery of the peripheral edge section pinched between multiple grooves 26, and the sealing body 20 is stuck to the substrate 12. Voids not filled with the adhesive 30 are formed on the groove 26 located on the inside within multiple grooves 26, and clearance grooves 28 communicated with the outside of the sealing body 20 are formed on the groove 26.



LEGAL STATUS

[Date of request for examination]

[Date of sending the examiner's decision of rejection]

[Kind of final disposal of application other than the examiner's decision of rejection or application converted registration]

[Date of final disposal for application]

[Patent number]

[Date of registration]

[Number of appeal against examiner's decision of rejection]

[Date of requesting appeal against examiner's decision of rejection]

[Date of extinction of right]

* NOTICES *

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CLAIMS

[Claim(s)]
[Claim 1] The transparent electrode formed in the transparent substrate front face with the transparent electrode material, and the luminous layer which a laminating is carried out to this transparent electrode, and consists of an EL ingredient, The back plate which the laminating was carried out to this luminous layer, countered the above-mentioned transparent electrode, and was formed, It has the closure object which seals the part in which the above-mentioned luminous layer was formed from the bonnet external world. The organic EL device characterized by having formed two or more slots which extended along with the above-mentioned closure object periphery section into the part pasted up on the above-mentioned substrate of the periphery section of this closure object, having applied the adhesives covering the above-mentioned periphery section perimeter to the part between two or more of these slots, and the above-mentioned closure object having pasted the above-mentioned substrate.
[Claim 2] The organic EL device according to claim 1 characterized by forming the opening which is not full of adhesives in the slot located in the inside of two or more above-mentioned slots.
[Claim 3] The organic EL device according to claim 1 or 2 characterized by forming in the above-mentioned slot the relief groove which leads to the outside of the above-mentioned closure object.
[Claim 4] The above-mentioned slot is an organic EL device according to claim 1, 2, or 3 characterized by consisting of two or more protruding lines formed in the periphery section of the above-mentioned closure object.
[Claim 5] While forming a transparent electrode in a transparent substrate front face with a transparent electrode material, carrying out the laminating of the luminous layer which becomes this transparent electrode from EL ingredient, countering the above-mentioned transparent electrode further at this luminous layer and preparing a back plate Into the part which pastes up the part in which the above-mentioned luminous layer was formed on the above-mentioned substrate of the periphery section of the closure object sealed from the bonnet external world The manufacture approach of the organic EL device characterized by forming two or more slots which extended along with the above-mentioned closure object periphery section, applying rear-spring-supporter adhesives to the above-mentioned periphery section perimeter including two or more of these slots, and pasting up the above-mentioned closure object on the above-mentioned substrate.
[Claim 6] The manufacture approach of the organic EL device according to claim 4 characterized by making it the above-mentioned adhesives not overflow into the part in which the opening adhesives are not [opening] full of the slot on inside was formed in, and the above-mentioned luminous layer was formed of this slot opening in case adhesives are applied to two or more above-mentioned slots.

[Translation done.]

DETAILED DESCRIPTION

[Detailed Description of the Invention]
[0001]
[Field of the Invention] This invention relates to the organic EL device used for the luminescence display of the flat-surface light source, a display, other predetermined patterns, etc., etc., and its manufacture approach.
[0002]
[Description of the Prior Art] Conventionally, an organic electroluminescence (erection luminescence) component forms the ITO film of translucency in the whole surface, etches it into the transparent substrate which consists of glass etc. at configurations, such as the shape of a predetermined stripe, forms a transparent electrode, vapor-deposits a luminous layer on the front face completely, and forms it in it. This luminous layer is an organic electroluminescence ingredient, has hole transport ingredients, such as a triphenylamine derivative (TPD), and consists of what carried out the laminating of the electronic transport ingredients, such as an aluminum chelate complex (Alq3) which is luminescent material, on it, and these mixing layers. And it is prepared by vacuum evaporationo etc. in the shape of [to which back plates, such as aluminum, Li, Ag, Mg, and In, counter the front face with the above-mentioned transparent electrode, and intersect perpendicularly with it] a stripe, and the light-emitting part is formed. This organic EL device uses a transparent electrode as a positive electrode, impresses an electrical potential difference by using a back plate as a negative electrode, and drives it with the so-called dot-matrix method which makes the predetermined intersection of the electrode of the shape of each [these] stripe emit light.

[0003] Here, since the organic electroluminescence ingredient which constitutes this luminous layer deteriorated easily under existence of moisture and a chemistry solvent, the closure object which consists a light-emitting part of a glass metallurgy group of wrap magnitude was fixed to the perimeter of a light-emitting part, and it had sealed the space of the closure inside of the body which has a light-emitting part. This space is filled up with the usually dried nitrogen gas.
[0004]
[Problem(s) to be Solved by the Invention] In the above-mentioned Prior art, the organic electroluminescence ingredient of a luminous layer was a brittle ingredient chemically, and since it deteriorated easily especially under existence of moisture, the substrate and the closure object needed to be fixed and sealed through adhesives etc. under desiccation nitrogen-gas-atmosphere mind. Especially, when the junction width of face of a closure object was not fully wide, there was a possibility that moisture might permeate from the very small clearance between planes of composition.
[0005] However, when a part for the large joint of this closure object was taken, the magnitude of the periphery section to a screen product became large, and had become the hindrance of a miniaturization. Furthermore, as adhesives did not overflow into a luminous layer side, the large width of face of a plane of composition needed to be taken, and at least the display was that to which the so-called outer frame part becomes large all the more, because the adhesives for junction also had an adverse effect on the organic electroluminescence ingredient.
[0006] This invention is made in view of the above-mentioned conventional trouble, and widely, the area of a display is possible also for the miniaturization of equipment, and also aims endurance at offering organic high El component and its manufacture approach.
[0007]
[Means for Solving the Problem] The laminating of the organic EL device of this invention is carried out to the transparent electrode formed in transparent substrate front faces, such as glass and resin, with transparent electrode materials, such as ITO, and this transparent electrode, the laminating of it is carried out to the luminous layer which consists of an EL ingredient, and this luminous layer, and it is equipped with the back plate which countered the above-mentioned transparent electrode and was formed, and the closure object which seals the part in which the above-mentioned luminous layer was formed from the bonnet external world. Two or more slots which extended along with the above-mentioned closure object periphery section are formed in the part pasted up on the above-mentioned substrate of the periphery section of this closure object, adhesives are applied to the above-mentioned periphery section perimeter inserted among two or more of these slots, and the above-mentioned closure object is an organic EL device adhered to the above-mentioned substrate. The opening which is not full of adhesives is formed in the slot located in the inside of two or more above-mentioned slots. Moreover, the relief groove which leads to the outside of the above-mentioned closure object is formed in the above-mentioned slot. Furthermore, the above-mentioned slot may consist of two or more protruding lines formed in the periphery section of the above-mentioned closure object.

[0008] Moreover, this invention forms a transparent electrode in transparent substrate front faces, such as glass and resin, with transparent electrode materials, such as ITO. While carrying out the laminating of the luminous layer which becomes this transparent electrode from EL ingredient, countering the above-mentioned transparent electrode further at this luminous layer and preparing a back plate Into the part which pastes up the part in which the above-mentioned luminous layer was formed on the above-mentioned substrate of the periphery section of the closure object sealed from the bonnet external world It is the manufacture approach of an organic EL device of forming two or more slots which extended along with the above-mentioned closure object periphery section, applying rear-spring-supporter adhesives to the above-mentioned periphery section perimeter between two or more of these above-mentioned slots, and pasting up the above-mentioned closure object on the above-mentioned substrate. Moreover, in case adhesives are applied to two or more above-mentioned slots, it is the manufacture approach of the organic EL device it is made for the above-mentioned adhesives not to protrude into the part in which the opening adhesives are not [opening] full of the slot on inside was formed in, the adhesives made and applied went into this slot space, and the above-mentioned luminous layer was formed.
[0009]
[Embodiment of the Invention] Hereafter, the operation gestalt of this invention is explained based on a drawing. Drawing 1 shows 1 operation gestalt of the organic EL device 10 of this invention. The transparent electrode by transparent electrode materials, such as ITO, is formed in one front faces of the transparent substrate 12, such as glass, and a quartz, resin, and this transparent electrode is formed for the organic EL device 10 of this operation gestalt in the shape of a stripe in the predetermined pitch. Moreover, the laminating of the luminous layer which consists of an EL ingredient by the about 500A hole transport ingredient and the about 500A electronic transport ingredient, and other luminescent material is carried out to the front face of a transparent electrode. And on the surface of the luminous layer, the laminating of the back plate by these alloys of about 99% of purity which contains Li about 0.01 to 0.05%, such as an aluminum-Li alloy, and other aluminum, Li(s), Ag, Mg, In(s), is carried out by the proper thickness of 500A - about 1000A. A transparent electrode and this back plate cross at right angles, counters, and is formed in the shape of a stripe. And from the transparent electrode by which the laminating was carried out to a back plate forms a light-emitting part 16 on a substrate 12.
[0010] The luminous layer of a light-emitting part 16 has a triphenylamine derivative (TPD), a hydrazone derivative, an arylamine derivative, etc. as a hole transport ingredient among mother's womb ingredients here. On the other hand, as an electronic transport ingredient, an aluminum chelate complex (Alq3), a distyrylbiphenyl derivative (DPVBi), an OKISA diazole derivative, a bis-CHIRIRU anthracene derivative, a benzo oxazole thiophene derivative, perylenes, and thiazoles are used. A still more proper luminescent material may be mixed, the luminous layer which mixed the hole transport ingredient and the electronic transport ingredient may be formed, and the ratio of a hole transport ingredient and an electronic transport ingredient can be suitably changed in 10:90 thru/or 90:10 in that case.
[0011] And the closure object 20 which carries out bonnet seal has pasted up the whole surface of a light-emitting part 16 on the substrate 12 at least. The closure object 20 is formed with metals, such as aluminum, resin, other inorganic materials, etc., and consists of the space section 22 which holds a light-emitting part 16, and the periphery section 24 pasted up on a substrate 12. Two or more slots 26 are formed [the periphery section 24] in parallel along with the periphery section at the adhesion side side of a substrate 12. In the slot 26, it is open for free passage so that the relief groove 28 which carried out opening may intersect perpendicularly outside. Between this slot 26, as an opening remains in the slot 26 on inside, adhesives 30 are applied, the space section 22 is sealed, and the light-emitting part 16 is closed from the external world.
[0012] The manufacture approach of the organic EL device 10 of this operation gestalt forms a transparent electrode in the front face of the transparent substrates 12, such as glass, and a quartz, transparence resin, in the shape of a stripe by etching or mask vacuum evaporationo with transparent electrode materials, such as ITO. Next, the laminating of the luminous layer which becomes the whole field surface in which this transparent electrode was formed from EL ingredient by the hole transport ingredient and the electronic transport ingredient is carried out by vacuum deposition or other vacuums thin film coating technology. And the laminating of the back plate of the shape of a stripe which carries out an abbreviation rectangular cross with a transparent electrode is carried out by vacuum thin film coating technology, such as vacuum deposition, on the surface of a luminous layer, and a light-emitting part 16 is formed.
[0013] A degree of vacuum is 6x10-6Torr, and vacuum evaporationo conditions are made to form with the evaporation rate of 50A/sec here in the case of EL ingredient. Moreover, luminous layer 14 grade may be formed by flash plate vacuum evaporationo. Flash plate vacuum deposition drops the source of vacuum evaporationo which heated preferably 300 degrees C - 600 degrees C of EL ingredients beforehand mixed by the predetermined ratio at 400 degrees C - 500 degrees C, and evaporates EL ingredient at a stretch. Moreover, the EL ingredient is held into a container, the container is heated quickly, and it may be made to vapor-deposit at a stretch.
[0014] Next, under desiccation nitrogen-gas-atmosphere mind, the closure object 20 is pasted up on a substrate 12 so that a light-emitting part 16 may be covered. At this time, adhesives 30 are applied to the periphery section 24 of two or more slots 26 excluding the slot 26 on inside most at least perimeter, and the closure object 20 is pasted up on a substrate 12. At this time, the applied adhesives 30 are absorbed by the opening of the slot 26 of breadth and the inside in the periphery section 24 by attachment to a substrate 12, and do not enter into the space section 22 which held the light-emitting part 16. Moreover, as shown in drawing 3 , the excessive adhesives 30 come out on the outside of a flash and the closure object 20 from the periphery section 24 by the relief groove 28.
[0015] According to the EL element and its manufacture approach of this operation gestalt, while an excessive amount is absorbed by two or more slots 26 and the adhesives 30 of the periphery section 24 of that closure object 20 paste up certainly

the adhesives with which a light-emitting part 16 is sealed with the closure object 20, and fixes the periphery section 24 on a substrate 12, the surplus adhesives 30 do not infiltrate into the hold space section 22 of a light-emitting part 16. A substrate 12 is certainly pasted over the perimeter and the periphery section 24 divided in further two or more slots 26 secures airtightness.

[0016] In addition, the organic EL device of this invention is not limited to the above-mentioned operation gestalt, and the number or configuration of a slot are not set up suitably and may absorb excessive adhesives by two or more slots, without preparing a relief groove. Moreover, the location and number of a relief groove are also suitably set up according to the magnitude of a substrate etc.

[0017] Furthermore, two or more slots may be formed in the part surrounded by two or more protruding lines, for example, carry out rear-spring-supporter formation of the protruding line at the perimeter at the periphery section of a tabular closure object, the part surrounded by the protruding line is the hold space of a light-emitting part, the front face of a protruding line pastes them up on a substrate, and excessive adhesives may be made to be absorbed by the slot between protruding lines.

[0018]

[Effect of the Invention] Even if the organic EL device and its manufacture approach of this invention narrow adhesion width of face of the periphery section of the closure object which seals a light-emitting part, while being able to paste them up certainly, excessive adhesives do not sink into the hold space of a light-emitting part. By this, width of face of the periphery section can be narrowed to the area for a display, it can contribute to the miniaturization of a display, and endurance can also be made high.

[Translation done.]

DESCRIPTION OF DRAWINGS

[Brief Description of the Drawings]
[Drawing 1] It is drawing of longitudinal section of the organic EL device of 1 operation gestalt of this invention.
[Drawing 2] It is the tooth back of the closure object of the organic EL device of this operation gestalt.
[Drawing 3] It is drawing of longitudinal section showing other adhesion conditions of the closure object of the organic EL device of this operation gestalt.
[Description of Notations]
10 Organic EL Device
12 Substrate
16 Light-emitting Part
20 Closure Object
22 Space Section
24 Periphery Section
26 Slot
28 Relief Groove
30 Adhesives

[Translation done.]

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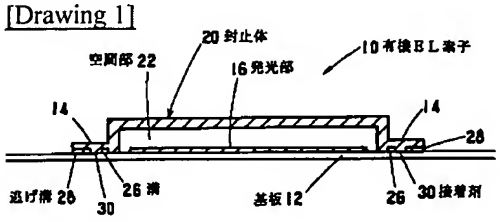
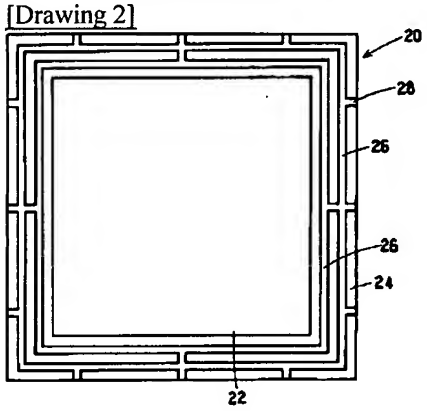
DRAWINGS

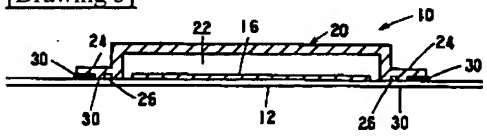
[Drawing 1]



[Drawing 2]



[Drawing 3]



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(19)日本国特許庁（ＪＰ）　(12)公開特許公報（Ａ）　(11)特許出願公開番号
特開2000－100562
（P2000－100562A）
(43)公開日　平成12年４月７日(2000.4.7)

(51)Int.Cl.⁷	識別記号	ＦＩ		テーマコード（参考）
Ｈ０５Ｂ　33/04		Ｈ０５Ｂ　33/04		３Ｋ００７
33/10		33/10		
33/14		33/14	Ａ	

審査請求　未請求　請求項の数６　ＯＬ　（全４頁）

(21)出願番号　特願平10－268489

(22)出願日　平成10年９月22日(1998.9.22)

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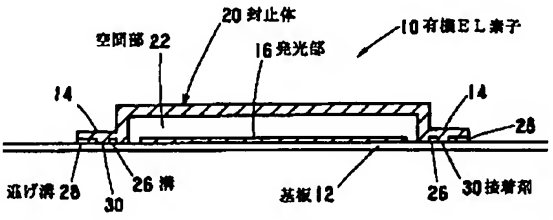
(54)【発明の名称】　有機ＥＬ素子とその製造方法

(57)【要約】
【課題】　表示部の面積が広く装置の小型化も可能で、耐久性も高い有機Ｅｌ素子とその製造方法を提供する。
【解決手段】　ガラスや樹脂等の透明な基板１２の表面にＩＴＯ等の透明な電極材料により形成された透明電極と、この透明電極に積層され、ＥＬ材料からなる発光層と、この発光層に積層され、透明電極に対向して形成された背面電極から成る発光部１６を有し、発光部１６を覆い外界から密封する封止体２０とを備える。この封止体２０の周縁部２４の基板１２に接着される部分には、封止体２０の周縁部２４に沿って延びた複数の溝２６が形成され、この複数の溝２６の間で挟まれる周縁部２４の全周に接着剤３０が塗布されて、封止体２０が基板１２に接着されている。複数の溝２６のうちの内側に位置する溝２６には、接着剤３０が充満していない空隙が形成され、溝２６には封止体２０の外側に通じる逃げ溝２８が形成されている。



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【特許請求の範囲】

【請求項１】　透明な基板表面に透明な電極材料により形成された透明電極と、この透明電極に積層されＥＬ材料からなる発光層と、この発光層に積層され上記透明電極に対向して形成された背面電極と、上記発光層が形成された部分を覆い外界から密封する封止体とを備え、この封止体の周縁部の上記基板に接着される部分に、上記封止体周縁部に沿って延びた複数の溝が形成され、この複数の溝の間の部分に上記周縁部全周にわたる接着剤が塗布されて上記封止体が上記基板に接着されていることを特徴とする有機ＥＬ素子。

【請求項２】　上記複数の溝のうちの内側に位置する溝には、接着剤が充満していない空隙が形成されていることを特徴とする請求項１記載の有機ＥＬ素子。

【請求項３】　上記溝には上記封止体の外側に通じる逃げ溝が形成されていることを特徴とする請求項１または２記載の有機ＥＬ素子。

【請求項４】　上記溝は、上記封止体の周縁部に形成された複数の突条からなることを特徴とする請求項１，２または３記載の有機ＥＬ素子。

【請求項５】　透明な基板表面に透明な電極材料により透明電極を形成し、この透明電極にＥＬ材料からなる発光層を積層し、この発光層にさらに上記透明電極に対向して背面電極を設けるとともに、上記発光層が形成された部分を覆い外界から密封する封止体の周縁部の上記基板に接着される部分に、上記封止体周縁部に沿って延びた複数の溝を形成し、この複数の溝を含む上記周縁部全周にわたり接着剤を塗布して上記封止体を上記基板に接着することを特徴とする有機ＥＬ素子の製造方法。

【請求項６】　上記複数の溝に接着剤を塗布する際に、内側の溝に接着剤が充満していない空隙を形成し、この溝空隙により上記発光層が形成された部分に上記接着剤がはみ出さないようにすることを特徴とする請求項４記載の有機ＥＬ素子の製造方法。

【発明の詳細な説明】

【０００１】

【発明の属する技術分野】この発明は、平面光源やディスプレイ、その他所定のパターン等の発光表示に用いられる有機ＥＬ素子とその製造方法に関する。

【０００２】

【従来の技術】従来、有機ＥＬ（エレクトルミネッセンス）素子は、ガラス等からなる透明な基板に、透光性のＩＴＯ膜を一面に形成し、所定のストライプ状等の形状にエッチングして透明電極を形成し、その表面に発光層を全面蒸着して形成している。この発光層は、有機ＥＬ材料であり、トリフェニルアミン誘導体（ＴＰＤ）等のホール輸送材料を有し、その上に発光材料であるアルミキレート錯体（Ａｌｑ３）等の電子輸送材料を積層したものや、これらの混合層からなる。そしてその表面にＡｌ、Ｌｉ、Ａｇ、Ｍｇ、Ｉｎ等の背面電極が、上記透明

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電極と対向して直交するストライプ状に蒸着等で設けられ、発光部を形成している。この有機ＥＬ素子は、透明電極を正極とし、背面電極を負極として電圧を印加し、これら各ストライプ状の電極の所定の交点を発光させる、いわゆるドットマトリックス方式により駆動される。

【０００３】ここで、この発光層を構成する有機ＥＬ材料は、水分や化学溶媒の存在下で容易に劣化することから、発光部を覆う大きさのガラスや金属からなる封止体が、発光部の周囲に固定され、発光部を有する封止体内の空間を密閉していた。この空間には、通常乾燥した窒素ガス等が充填されている。

【０００４】

【発明が解決しようとする課題】上記従来の技術の場合、発光層の有機ＥＬ材料は化学的に脆弱な材料であり、特に水分の存在下で容易に劣化することから、乾燥窒素雰囲気下で、基板と封止体を接着剤等を介して固定し、密閉する必要があった。特に封止体の接合幅が十分に広くないと、接合面の微少な隙間から水分が浸入するおそれがあった。

【０００５】しかし、この封止体の接合部分を広くとると、表示面積に対する周縁部の大きさが大きくなり、小型化の妨げとなっていた。さらに、接合のための接着剤も有機ＥＬ材料に悪影響を与えるので、接着剤が発光層側にはみ出さないように、接合面の幅を広くとる必要もあり、ますます、表示部位外のいわゆる額縁部分が広くなってしまうものであった。

【０００６】この発明は上記従来の問題点に鑑みてなされたものであり、表示部の面積が広く装置の小型化も可能で、耐久性も高い有機Ｅｌ素子とその製造方法を提供することを目的とする。

【０００７】

【課題を解決するための手段】この発明の有機ＥＬ素子は、ガラスや樹脂等の透明な基板表面にＩＴＯ等の透明な電極材料により形成された透明電極と、この透明電極に積層され、ＥＬ材料からなる発光層と、この発光層に積層され、上記透明電極に対向して形成された背面電極と、上記発光層が形成された部分を覆い外界から密封する封止体とを備える。この封止体の周縁部の上記基板に接着される部分には、上記封止体周縁部に沿って延びた複数の溝が形成され、この複数の溝間で挟まれる上記周縁部全周に接着剤が塗布されて、上記封止体が上記基板に接着されている有機ＥＬ素子である。上記複数の溝のうちの内側に位置する溝には、接着剤が充満していない空隙が形成されているものである。また、上記溝には上記封止体の外側に通じる逃げ溝が形成されている。さらに、上記溝は、上記封止体の周縁部に形成された複数の突条からなるものでもよい。

【０００８】またこの発明は、ガラスや樹脂等の透明な基板表面に、ＩＴＯ等の透明な電極材料により透明電極

を形成し、この透明電極にＥＬ材料からなる発光層を積層し、この発光層にさらに上記透明電極に対向して背面電極を設けるとともに、上記発光層が形成された部分を覆い外界から密封する封止体の周縁部の上記基板に接着される部分に、上記封止体周縁部に沿って延びた複数の溝を形成し、この複数の上記溝間の上記周縁部全周にわたり接着剤を塗布して上記封止体を上記基板に接着する有機ＥＬ素子の製造方法である。また、上記複数の溝に接着剤を塗布する際に、内側の溝に接着剤が充満していない空隙が形成されるようにし、塗布した接着剤がこの溝空間に入り、上記発光層が形成された部分には上記接着剤がはみ出さないようにする有機ＥＬ素子の製造方法である。

【０００９】

【発明の実施の形態】以下、この発明の実施形態について図面に基づいて説明する。図１は、この発明の有機ＥＬ素子１０の一実施形態を示す。この実施形態の有機ＥＬ素子１０は、ガラスや石英、樹脂等の透明な基板１２の一方の表面にＩＴＯ等の透明な電極材料による透明電極が形成され、この透明電極は、所定のピッチでストライプ状に形成されている。また透明電極の表面には、５００Å程度のホール輸送材料、及び５００Å程度の電子輸送材料、その他発光材料によるＥＬ材料からなる発光層が積層されている。そして発光層の表面には、Ｌｉを０．０１～０．０５％程度含む純度９９％程度のＡｌ－Ｌｉ合金、その他Ａｌ、Ｌｉ、Ａｇ、Ｍｇ、Ｉｎ等またはこれらの合金による背面電極が、適宜の５００Å～１０００Å程度の厚みで積層されている。この背面電極は、透明電極と直交して対向し、ストライプ状に形成されている。そして基板１２上に積層された透明電極から背面電極までが発光部１６を形成する。

【００１０】ここで発光部１６の発光層は、母胎材料のうちホール輸送材料としては、トリフェニルアミン誘導体（ＴＰＤ）、ヒドラゾン誘導体、アリールアミン誘導体等がある。一方、電子輸送材料としては、アルミキレート錯体（Alq_3）、ジスチリルビフェニル誘導体（ＤＰＶＢｉ）、オキサジアゾール誘導体、ビスチリルアントラセン誘導体、ベンゾオキサゾールチオフェン誘導体、ペリレン類、チアゾール類等を用いる。さらに適宜の発光材料を混合してもよく、ホール輸送材料と電子輸送材料を混合した発光層を形成してもよく、その場合、ホール輸送材料と電子輸送材料の比は、１０：９０乃至９０：１０の範囲で適宜変更可能である。

【００１１】そして、少なくとも発光部１６の全面を覆い密封する封止体２０が基板１２に接着されている。封止体２０は、アルミニウム等の金属や樹脂、その他無機材料等により形成され、発光部１６を収容する空間部２２と基板１２に接着される周縁部２４とからなる。周縁部２４には、基板１２の接着面側に、溝２６が周縁部に沿って平行に複数本形成されている。溝２６には、外側に開口した逃げ溝２８が直交するように連通している。この溝２６間には、内側の溝２６に空隙が残るようにして接着剤３０が塗布され、空間部２２を密閉し、発光部１６を外界から封止している。

【００１２】この実施形態の有機ＥＬ素子１０の製造方法は、ガラスや石英、透明樹脂等の透明な基板１２の表面に、ＩＴＯ等の透明な電極材料により透明電極を、エッチングまたはマスク蒸着等でストライプ状に形成する。次に、この透明電極が形成された面全面に、ホール輸送材料及び電子輸送材料によるＥＬ材料からなる発光層を、真空蒸着やその他真空薄膜形成技術により積層する。そして、発光層の表面に、透明電極と略直交するストライプ状の背面電極を真空蒸着等の真空薄膜形成技術により積層して、発光部１６を形成する。

【００１３】ここで蒸着条件は、例えば、真空度が6×10^{-6}Ｔｏｒｒで、ＥＬ材料の場合５０Å／ｓｅｃの蒸着速度で成膜させる。また発光層１４等は、フラッシュ蒸着により形成してもよい。フラッシュ蒸着法は、予め所定の比率で混合したＥＬ材料を、３００℃～６００℃好ましくは４００℃～５００℃に加熱した蒸着源に落下させ、ＥＬ材料を一気に蒸発させるものである。またそのＥＬ材料を容器中に収容し、急速にその容器を加熱し、一気に蒸着させるものでもよい。

【００１４】次に乾燥窒素雰囲気下で、発光部１６を覆うように封止体２０を基板１２に接着する。このとき、複数の溝２６の少なくとも一番内側の溝２６を除く周縁部２４全周に接着剤３０を塗布して封止体２０を基板１２に接着する。このとき、塗布した接着剤３０は、基板１２への張り付けにより周縁部２４で広がり、内側の溝２６の空隙に吸収され、発光部１６を収容した空間部２２には入り込まない。また、図３に示すように、余分な接着剤３０は、逃げ溝２８により周縁部２４からはみ出し、封止体２０の外側に出てくる。

【００１５】この実施形態のＥＬ素子とその製造方法によれば、発光部１６が封止体２０で密封され、周縁部２４を固定する接着剤は、複数の溝２６により余分な量が吸収されその封止体２０の周縁部２４の接着剤３０が確実に基板１２に接着されるとともに、余った接着剤３０が発光部１６の収容空間部２２に浸入することがない。さらに複数の溝２６で区切られた周縁部２４は、基板１２に全周にわたり確実に接着し、気密性を確保する。

【００１６】なお、この発明の有機ＥＬ素子は、上記実施形態に限定されるものではなく、溝の本数や形状は適宜設定されるものであり、逃げ溝を設けずに、複数の溝により余分な接着剤を吸収するものでもよい。また、逃げ溝の位置や本数も基板の大きさ等に合わせて適宜設定される。

【００１７】さらに、複数の溝は、複数の突条により囲まれる部分で形成されても良く、例えば、板状の封止体の周縁部に突条を全周にわたり形成して、その突条で囲

まれる部分が発光部の収容空間であり、突条の表面が基板に接着され、余分な接着剤は突条間の溝に吸収されるようにしてもよい。

【００１８】

【発明の効果】この発明の有機ＥＬ素子とその製造方法は、発光部を密封する封止体の周縁部の接着幅を狭くしても確実に接着可能であるとともに、余分な接着剤が発光部の収容空間にしみこまないものである。これにより、表示部分の面積に対して周縁部の幅を狭くすることができ、表示装置の小型化に寄与し、耐久性も高いものにすることができる。

【図面の簡単な説明】

【図１】この発明の一実施形態の有機ＥＬ素子の縦断面図である。

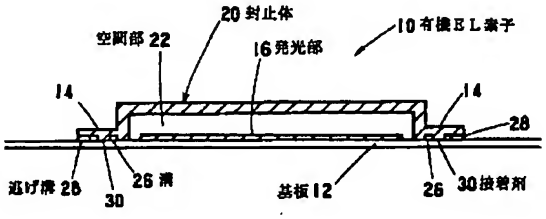
【図２】この実施形態の有機ＥＬ素子の封止体の背面である。

【図３】この実施形態の有機ＥＬ素子の封止体の他の接着状態を示す縦断面図である。

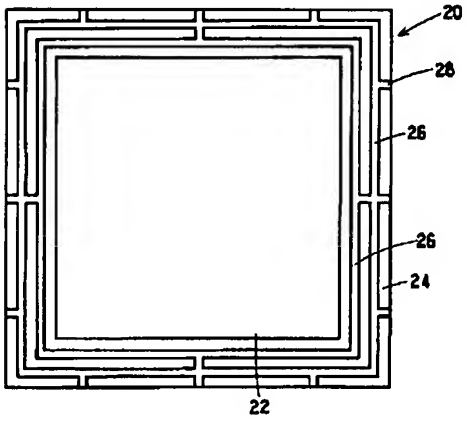
【符号の説明】

１０　有機ＥＬ素子
１２　基板
１６　発光部
２０　封止体
２２　空間部
２４　周縁部
２６　溝
２８　逃げ溝
３０　接着剤

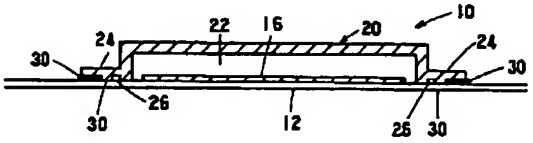
【図１】



【図２】



【図３】



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Ｆターム(参考)　3K007 AB00 BB01 CA01 CA02 CA05
CB01 DA00 DB03 EB00 FA01
FA03